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21 January 2000

Mr. James Harris, P.E.
U.S. Environmental Protection Agency
Region VIII, Montana Operations
Federal Building
301 South Park, Drawer 10096
Helena, MT 59626-0096

Subject: Review Comments on Draft Technical Impracticability Evaluation for Groundwater Restoration
Former Somers Tie Treating Plant, Somers, Montana
RAC Contract No. 68-W7-0026
Work Assignment No 014-ROBF-0863
Document Control No. RFW014-2A-AEKF

Dear Mr. Harris:

Roy F. Weston, Inc. (WESTON®), in conjunction with Savant Enterprises, LLC (Savant), herewith transmits comments made for the above referenced site on the *Draft Technical Impracticability Evaluation for Groundwater Restoration, Former Somers Tie Treating Plant, Somers, Montana* dated 22 December 1999. The reviewers included Keith Pass and Steve Young (WESTON) and Karen Holliway (Savant). The 1993 EPA *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration* (Directive 9234.2-25, Interim Final) was utilized in evaluating the Draft TI. The *Technical Impracticability Evaluation Report, Libby Ground Water Site, Montana* (Woodward-Clyde, 1999) was used as an example for comparison purposes.

General and specific comments follow this letter, however, our impression of the Draft TI is that while it is not organized exactly like the Libby document, its organization is adequate and follows a logical progression. Our disappointment lies in that the Draft TI evaluation is not as well developed and supported, as is the case in the Libby document. In addition, WESTON was under the impression that the *Phase II Groundwater Remedy Remedial Design* (ReTec, 1998) had, in part, been prepared with the upcoming TI process in mind. Although some issues were previously identified in the Phase II report as needing work, in comparison, the groundwater conceptual model presented in the Phase II report was much better organized and presented than that of the Draft TI. Even though the Libby document provided a good example of the type and presentation of information needed to support a TI evaluation, much of the information presented in the Phase II report and the *Phase I Groundwater Remedy Annual CERCLA Report* (ThermoRetec, 1999) was not utilized or was poorly presented.

Attachment 1 contains general and specific comments on the Draft TI evaluation. Attachment 2 is a table that correlates WESTON's previous comments on the 1998 Phase II groundwater remedy report to where they apply in the Draft TI evaluation. Should you have any questions please contact Keith Pass at (303) 980-6800.

Regards,

ROY F. WESTON, INC.
Keith D. Pass

Keith D. Pass, P.G.
Site Manager

Savant Enterprises, LLC

Karen Holliway, CPG, CEM
Senior Consultant

Enclosure
cc: Weston Project File 18.0
RAC AO File - Vernon Hills

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RAC AO File - Vernon Hills

Attachment 1
Review Comments

Draft Technical Impracticability Evaluation
for Groundwater Restoration
Former Somers Tie Treating Plant, Somers, Montana
(22 December 1999)

Document Control No. RFW014-2A-AEKF

General Comments

1. The Draft Technical Impracticability (TI) evaluation lacks substance to support the conclusions and recommendations presented therein. More importantly, the Draft TI does not develop or, in some cases provide, the types of data and analyses necessary to address each of the TI evaluation components, as presented in the EPA guidance document. Specifically, discussions are insufficient with regard to contaminant sources, contaminant properties and characteristics, contaminant distribution, release mechanisms and rates, and identification of receptors. Additionally, the evaluation of restoration potential does not include many of the details identified in the TI guidance document.

2. The document assumes that the reader has detailed familiarity with the site. The document must be composed in such a way as to provide readers that are not familiar with the site the information/data necessary to understand the site without having to rely to historical documents.

3. A more focused and succinct synopsis should be presented in Section 1 and Section 2 of the document describing the TI process and regulatory history for the Somers site, describing the background and the features (historical and current), describing complexities of the geology and all constituents of concern, and describing actions taken to reduce risk to human health and the environment (see specific comments below).

4. In general, the document should reference and discuss " the limitations of available technologies combined with geological and chemical complexities of a site", which is the general basis for a TI waiver process. The document focuses more on the limitations of the technology not being achievable within the 50-year time frame. Make sure the discussion relates (with supporting documentation) the geological and chemical complexities of the Somers site to the groundwater remedy currently in operation and to other available technologies. The other available technology(s) discussion should include those identified in the Remedial Design Investigation (RDI) and applicable new technologies proposed or developed since the RDI.

5. The bedrock groundwater system is not fully addressed. The description of the hydrogeologic nature of the bedrock is incomplete and the potential for contaminant movement into and through the bedrock system is not well supported. This is important because both the Town of Somers water supply well and Flathead Lake are identified as receptors along the bedrock groundwater pathway. The TI evaluation must specify the horizontal and vertical extent of the area for which the TI determination is sought.

6. The selection of naphthalene and benzo(a)pyrene as the only contaminants of concern for the fate and transport analysis fails to address the more mobile SVOC components.

7. The ditch from the CERCLA Lagoon to the swamp pond is referred to as "the drainage ditch," "overflow ditch," " the discharge ditch," and the "ditch." The reference to this feature needs to clarified and applied consistently throughout the document.

8. For figures that show well locations, suggest the use of different symbols each for: extraction wells, injection wells, monitoring wells, piezometers, bedrock wells, borings and abandoned holes. The general base map used for the figures is inconsistent between figures in the document.

9. Nowhere in the document is there a comprehensive table and/or figure detailing the boreholes and monitor wells that have been installed since the initial investigation of the site. Many of the logs presented in Appendix D are never discussed in the text or indicated on a figure. For well and piezometer construction information, Table 2-1 from the *Phase I Groundwater Remedy Annual CERCLA Report (June, 1999)* would be a good starting point (e.g., the sampling status could be changed to "active" vs. "abandoned", and the geologic unit screened could be easily added). WESTON realizes that some of the older wells/boreholes may not have location survey data; however, one may use an "approximate location" symbol on a figure for such cases. A figure showing all monitor well/borehole locations and a table describing construction/installation information supplemented by a analytical summary table should be utilized to provide a reviewer, in part, a clear and concise picture of the site.

10. A database, map, and discussion should be provided identifying all wells within a one mile radius of the site. At a minimum, the database should provide the well owner information, location, available construction information, date of construction, status of well, and the use of the well. The source of the information should be referenced. This evaluation is critical to understanding groundwater use and potential receptors in the area.

11. There is no comprehensive historical groundwater data table provided (use Table 3-7 from the annual groundwater CERCLA report for 1998 and add the data from September 1999).

12. Unless the volume for a "pool" can be quantified, the use of this word is misleading and should be discontinued throughout the document.

13. The contaminant of concern zinc is not addressed anywhere in the document, other than to say "zinc contaminated soils ...were targeted for excavation." (page 1-3, lines 21-23).

14. The evaluation of alternate groundwater remedies overlooks potential new technologies that may be applicable to the site.

15. Provide a list of acronyms. Check for first occurrences of acronyms and define in the text.

Specific Comments

16. **Figure 1-1.** Should be preceded with a figure that shows the location of the site in relation to the community of Somers and Flathead Lake, which is truly how the reference is presented on page 1-1 (i.e., Site Location). The figure should indicate the residences to the east-northeast and along the southern boundary of the site, an indication of surrounding land use, and the location of the town well. Such a figure would also help support the discussion of potential receptors. Depending on the scale of the figure necessary to illustrate the above stated information, the property boundary of the site should be shown. If the scale of the figure is sufficiently small such that the property boundary is not discernable, then the boundary must be presented on a later figure (e.g., Figure 1-2 - Site Layout).

17. **Figure 1-1.** Revise figure to show the current property boundaries.

18. **Figure 1-2.** Label the ditch as referenced on page 1-3, "drainage ditch" (or whichever term was selected for consistency - see General Comment).

19. **Figure 1-2.** For those not familiar with the site, the labels for the current site features could be confusing. The legend should be expanded to identify the current features of the remedy as related to the historic site features (e.g., different colors if that is the way it is to be presented).

20. **Section 1.1.2.** Should include more specific detail as to what was contained in the Record of Decision (e.g., what remedies did the ROD evaluate, what were the key elements of the Final Remedy, etc.) with specific identification of changes instituted as a result of the 1992 and 1998 Explanation of Significant Differences (ESD).

21. **Page 1-5, Paragraph starting with Line 16.** Includes a discussion with regard to some analysis and decision-making associated with the groundwater remedy. A document reference for the conclusion presented should be provided.

22. **Section 1.2.** The Technical Impracticability Process section does not describe the TI process. The discussion should focus on the process and not be littered with Somers site specific items. Describe the purpose and reasoning for a TI waiver, then describe the actual TI process (i.e., requirements, conditions, and/or components). Set the regulatory stage before introducing site specific details. After describing the TI process, a simple summary could be presented at the end of the section indicating that the Somers site is a classic model for the application of the TI process due to the complex geologic environment, complex geochemical properties of

constituents of concern, complex fate and transport of those constituents, and remedy operations that indicate limited restoration of the aquifer to date.

23. **Page 1-6, 3rd Paragraph**. The use of the term "paper-thin" should be replaced with "...thin, discontinuous sand lenses and small fractures." Additionally the use of the term "droplet" should be replaced with "creosote staining and residual droplets."

24. **Page 1-6, Line 24.** The sentence states that the TI guidance "establishes" alternative, protective remedial strategies. This is not the case, rather the guidance <u>recommends</u> objectives and options for alternative strategies.

25. **Page 1-7, Line 4.** Sentence should be modified to read: "<u>However,</u> EPA will not allow a TI waiver to be granted based <u>solely</u> upon inadequacies ...".

26. **Section 2.** The description of the historical investigative activities and results lack detail. It has been sixteen years since the initial investigation at the site, and the history is summarized in less than a complete page and one time line table.

27. **Page 2-2, Line 15.** Discussion with regard to creosote would benefit from a succinct sentence that indicates something like "Ycreosote constituents are denser than water and because of this they are a sinking product that poses…".

28. **Table 2-1.** Please identify who conducted the Remedial Investigations referenced here and on page 2-2.

29. **Section 2.2.** To meet requirements of the TI process, the Geology and Hydrologic Setting needs to be supplemented with literature sources for a local regional perspective along with the site specific interpretations. Expand discussion to present more information on the suspected depositional environments in the area and at the site.

30. **Page 2-4, Line 7.** A reference is made to a database of wells at the site. Please provide a printout for the database in Appendix D. At a minimum, the information should include well identification, date installed, well status (e.g., monitored, water level only, piezometer, abandoned), total depth of boring, total depth of well, screened interval, unit screened, casing material, casing diameter, general lithology (or unit subdivision) and associated depths, and key observations e.g., creosote staining, odor.

31. **Page 2-4, Line 24.** "Much of the site … is believed to have been previously covered by Flathead Lake." Provide supporting information to substantiate this belief (e.g., personal communication with ?, lake elevation records from Corp of Engineers, historical photographs, etc.).

32. **Page 2-4, Line 33.** The paragraph discusses the identification of four units at the site. A generalized lithologic column should be developed to supplement the discussion that would also depict the discontinuous nature of the stratigraphy as a result of the depositional

environments at the site. This would provide some demonstration as to the complexity of the geology at the site.

33. **Page 2-6, Line 4.** There is a reference to root traces in the area of the CERCLA lagoon. Expand the discussion to explain the significance of this observation. Why do you think the occurrence of root traces is concentrated in the CERCLA lagoon area?

34. **Page 2-6, Line 9.** The different lithologic depths given in the description of BH-3 do not match the depiction of the borehole in Figure A-4. The cross section also indicates that contamination was detected either by sight or smell in BH-3 to a depth of approximately 75 feet below ground surface (bgs, within 30 to 35 feet of suspected bedrock). This observation should be included in the description of BH-3. The location of BH-3 is also not shown on Figure A-1, Cross Section Location Map. This paragraph describes the materials below 65 feet bgs in BH-3 as silty clays with no sand. No mention is made of similar depths in other borings. Was the predominantly silty clay present at other locations? Can it be described as a continuous unit? Have any geotechnical analyses been conducted on this material.

35. **Page 2-6, Line 18.** Forego the use of the word "pool". The meaning of the sentence would still be conveyed without the use of "(i.e., a pool)".

36. **Page 2-6, Line 19.** Understanding the topography of the bedrock surface is important in potential DNAPL migration; however, so are bedrock characteristics such as fracturing, degree of weathering, permeability, vuggy porosity, solution channels (especially with a dolomite bedrock), etc. Please supplement the bedrock topography description with other bedrock characteristics equally important to DNAPL migration.

37. **Page 2-6, Line 21.** It is noted several times in the document that a DNAPL pool has never been encountered at the site. However, according to the cross sections depicting monitor wells located downgradient (hydrologically or bedrock topography) of the CERCLA lagoon, there are no wells screened either in the bedrock or in the gravelly layer just above bedrock. Is this the case? What wells are set in bedrock or the gravel layer and what are their locations with regard to the source areas (past and present) on site. Refer to General Comment 9 with regard to summary of well information.

38. **Page 2-6, Lines 24 to 29.** This paragraph is confusing with regard to the direction of slope on the bedrock surface. The bedrock is reported to outcrop on the west side of the property and dip steeply (Figure A-2). This would suggest a west to east downward slope on the bedrock surface. Yet the paragraph indicates that the depth to bedrock is less to the north and greater to the south of the old CERCLA lagoon. In addition, Figure 2-1 indicates a west-southwest to east-northeast downward slope on the bedrock surface which would suggest that the depth to bedrock on the south (west) side of the old CERCLA lagoon should be less than the depth to bedrock on the north (east) side. The use bedrock surface <u>elevation</u> instead of depth to bedrock would clarify the discussion.

39. **Page 2-6, Line 29.** A reference is made to nine wells and borings used to create the top of bedrock map shown in Figure 2-1. Identify which wells were used to create this map and modify the symbol on the map to indicate those wells that are considered bedrock wells. This symbol should be applied to all maps.

40. **Page 2-6, Line 36.** Well S-7 is identified as one of two wells used to determine bedrock surface slope. Figure A-7 depicts this well as terminating in a clayey sand and does not indicate bedrock was reached. Additionally, the borehole log for S-6 describes termination at 29.5 feet bgs in a silty sand. Please explain the use of this well for determining bedrock surface and the discrepancies between the cross section and the borehole log.

41. **Page 2-6, Line 39 to page 2-7, Line 1.** This describes a gravel layer encountered above bedrock. Was this gravel unit encountered elsewhere on the site? If other borings encountered this unit they should be mentioned and the areal extent of the unit described. This gravel layer is being described as part of the separate bedrock aquifer in Section 2.2.2 and should be thoroughly characterized in a DNAPL investigation. The gravel layer would be a preferential pathway for DNAPL migration. This gravel layer reportedly extends from the CERCLA lagoon area towards the lake. Is there a downgradient well screened in the gravel layer between the lagoon and the lake or other potential receptor?

42. **Section 2.2.2, Hydrogeology.** The discussion contains subjective interpretation with regard to the "surficial aquifer" that should be presented after aquifer characteristics are discussed. Understanding the aquifer characteristics will assist with demonstrating the subjective interpretation as to the potential usability of water from the surficial aquifer. Additionally, the surficial aquifer is also referred to as the "water table aquifer." The reference should be consistently made to the "surficial aquifer."

43. **Page 2-8, Line 31.** Reference is made "...that the lake discharges to the surficial aquifer...". The sentence should indicate that the lake "recharges" the surficial aquifer and that the aquifer discharges to the lake.

44. **Figure 2-2.** The text describes a situation of the lake recharging the surficial aquifer when the lake level is up and vice versa when the lake level is down. Why then does Figure 2-2 show the surficial aquifer elevation going down when the lake's elevation is up (except Fall 93), and vice versa. WESTON realizes that this is a function of lag time, storage capacity, pressure, etc.; however, to the unfamiliar reader this appears to be a contradiction to the text. A more thorough scientific description of the phenomena depicted in Figure 2-2 would help those reviewers that have not seen this presentation before.

45. **Page 2-10, Line 11.** It is stated that vertical flow was documented. Unless data other than fluid level measurements were collected and analyzed, vertical flow was not documented but rather vertical gradients were observed. Vertical gradients indicate the potential for vertical flow. Documentation of actual flow is a much more complicated issue. This is important because actual documented vertical movement of groundwater and possibly contaminants

would appear to contradict the argument that the contaminants are effectively "naturally contained due to the very low hydraulic conductivity."

46. **Page 2-10, Line 23.** As written, the sentence sounds as though both wells are constructed in the bedrock aquifer.

47. **Page 2-10, Line 31.** This paragraph reports hydraulic conductivity data from various tests performed at the site or on material sampled from the site. Most laboratory tests are designed to measure the hydraulic conductivity of samples in the vertical direction. If this is the case with these laboratory tests it should be noted in the text and addressed in the interpretation of these test results. Vertical hydraulic conductivity data are typically much less than horizontal values for the same medium. Also vertical conductivity values are not used to calculate horizontal groundwater flow velocity.

48. **Section 2.3, Source Characterization.** In accordance with the TI evaluation process, source characterization needs to include discussion with regard to areas of contaminant sources (differentiate between historical and current), properties of contaminants (e.g., chemical and geochemical properties), identification of source removal activities conducted, and contaminant distribution. The section should be adjusted so that the discussion flows from identification of sources, contaminant properties, source removal activity with demonstration of the sources remaining, followed by contaminant distribution discussion.

49. **Page 2-12, Lines 1 and 16.** Reference is made to assumptions for bulk density. Identify the source of these assumptions.

50. **Page 2-12, Line 15.** Why is the estimate of contaminated soil in the CERCLA lagoon Area 2 (south of Somers Road) based on 15 to 40 feet bgs when there was no excavation conducted in this area?

51. **Page 2-13, DNAPL Occurrence.** It is not clear what the point of this discussion really is. Stating that the mass of free-phase DNAPL present is relatively small compared to the residual DNAPL mass is unsubstantiated and unnecessary. The fact that free-phase DNAPL has not been observed in a sample bailer does not mean it is not present in the subsurface. Speculating on the relative quantities of free-phase versus residual DNAPL is not necessary. Regardless of the presence or lack of free-phase in monitor wells, it is difficult or impossible to estimate the amount of DNAPL present in the subsurface. This paragraph should be trimmed down to simply state what is known. Avoid additional supposition, as it adds nothing to the argument of TI.

52. **Page 2-13, Line 8.** A footnote suggests that dissolved iron may contribute to the discoloration of purged groundwater. This can, at times, be true. Has dissolved (or total) iron analyses been conducted on these wells? Can we quantify this suggestion?

53. **Page 2-13, Dissolved PAHs in Groundwater.** The mention of increasing concentrations in S-6 would seem to deserve more attention. The naphthalene concentration in S-6 for the

September 1999 sampling event (600 µg/L) was more than twice that of March 1999 and the highest to date. S-6 is not only not the flow path toward the Lake but it is between the site and several residences. The TI evaluation requires the extent of contaminants in all wells be identified and detections defined, not estimated. There are two wells located downgradient of S-6, S-84-15 and S-91-2. Well S-84-15 is part of the Voluntary Well sampling program and has been non-detect since September 1998. However, S-84-15 is screened from 11 to 16 feet bgs, whereas, S-6 is screened from 19.3 to 29.5 feet bgs. Well S-91-2 was not included in the historical data provided in the latest annual groundwater report but the well is screened from 25 to 35 feet bgs. In as much as naphthalene has a specific gravity of 1.15, well S-91-2 would be the well better suited to provide downgradient horizontal extent.

54. **Page 2-13, Line 30.** This paragraph describes a calculation for determining the mass of PAH compounds dissolved in groundwater. This method does not account for the variations in the plume concentration since it is applying a uniform concentration over the entire area and volume of the plume. In addition, the method does not account for contamination outside of the area of the treatment system drawdown (e.g., S-6, S-88-2 (?), S-88-3).

55. **Page 2-13, Line 30.** An effective porosity of 25 % was assumed for these calculations. Since this value is different from the 28% used elsewhere in this document, please provide justification for the selection of 25%. Also, the bulk density value of 100 lbs/ft3 does not agree with the value of 1.7 g/cm3 used elsewhere. Please provide justification and reference for the use of these values.

56. **Figure 2-4.** The north arrow is not positioned properly.

57. **Section 2.3.5.** Expand to identify and differentiate between historical sources and current sources. See comment on Section 2.3 above.

58. **Section 2.3.5.** This paragraph concludes that the mass adsorbed to the soil is limited to that which is calculated based on areas of known soil contamination. If this area coincides with the area of the groundwater plume, then this approach is sufficient. If, however, the groundwater plume extends some distance from the area of soil contamination considered for the calculations in Section 2.3.1, then the soil contamination associated with the groundwater plume has not been accounted for. In order to calculate the mass sorbed to the soil within the groundwater plume, an assumed distribution coefficient must be used in conjunction with the average groundwater contaminant concentration.

59. **Section 2.4.** Does not include identification of potential receptors as is required for a TI evaluation (e.g., human consumption private wells and town well, discharge to surface water, sediments, ecological). The Phase II Design document (ReTec, 1998) Section 4.1 needs to be incorporated into this TI evaluation, with the following item addressed. The Phase II Design Section 4.1 identifies Flathead Lake and the Town of Somers water supply well as receptors on the bedrock aquifer pathway. It also states that the upper aquifer is hydraulically connected to the bedrock aquifer. These two statements, if true, would suggest the need for a thorough evaluation of the bedrock aquifer flow system. Since the conclusions presented in the report

are that the bedrock aquifer is not threatened by the contaminants in the shallow system, there is a contradiction.

60. **Section 2.4.1.** Does not address the contaminated soils remaining in the Swamp Pond and the section of the discharge ditch not excavated. If an assumption is being made that areas other than the CERCLA lagoon are not to be considered source areas, then provide documenting evidence as to why those areas are not being considered. Beach sediments were previously described as being contaminated. Provide documentation that no more contaminated sediments exist (e.g., confirmation sampling after excavation, boreholes to depth, etc.) or, provide an explanation as to why the sediments would not be considered a source of contamination to groundwater or Flathead Lake. This will help close the loop on potential sources identified earlier in the document, especially for a reviewer not familiar with the site's history. This could possibly be addressed in Section 2.3.

61. **Section 2.4.3.** General comments on the section to support the objectives of the TI evaluation process:

- How is DNAPL a transport mechanism. Something needs to be effecting DNAPL to transport it in the environment.
- This is the first real discussion of dissolved-phase constituents NAPLs, which are present at the site. The presence and extent of NAPLS needs to be identified earlier in the document, e.g., Section 2, as another general constituent of concern.
- The discussion presented in this section would be better supported with a summary presentation of historical data (contained in an Appendix), e.g., Appendix B in the Libby TI Evaluation Report.

62. **Page 2-19, Line 5**. Sorption and biodegradation should be added to the list of processes that form a contaminant plume.

63. **Page 2-19, Line 19.** How does Figure 2-5 show the distribution of dissolved PAHs?

64. **Page 2-19, Paragraph starting with Line 19.** This paragraph is based on the premise that the PAH plume has stabilized with regard to size or concentration. The variability of the PAH concentrations shown in Figure 2-4 do not support the concept of stabilization. The last two sentences indicated that the historic data support the argument that concentrations are stablewith a sumn or declining. Review of the figures referenced (2-6 and 2-7) does not support this implication. In fact both figures appear to suggest an increase in concentration over the last two years. This apparent disagreement needs to be addressed more directly.

65. **Page 2-19, Paragraph starting with Line 28.** The discussion of statistical analysis needs more support in the form of the actual results of the analyses. This is especially true of the claim that no significant trend was observed in the data since this statement is contrary to the apparent behavior of the data as displayed on Figures 2-6 and 2-7.

66. **Page 2-22, Line 17.** This paragraph describes the selection of naphthalene and benzo(a)pyrene as constituents of concern. There is no explanation of why these compounds were chosen as representative of the dissolved plume. Other SVOC compounds known to be present are more mobile and should be considered as well.

67. **Page 2-22, Line 23.** This paragraph is poorly developed and, therefore, raises many questions:

- The artesian aquifer has not been previously introduced and/or described.
- Previous descriptions have been made indicating the surficial and bedrock aquifers are hydraulically connected. It is assumed that the artesian aquifer mentioned in this paragraph is part of the bedrock groundwater regime and constitutes the town well.
- Given the description of a 25-foot aquitard, it is assumed that the artesian and bedrock aquifers are not connected? Where does the "25-foot" aquitard come from?
- Monitor well S-85-8a is screened in the surficial aquifer (19-29 feet bgs) while well S-85-8b is assumed to be screened in the bedrock aquifer (90 to 95 feet bgs). There is a distance of 61 feet between the screened intervals of these two wells. Describe the use of these two wells in the calculations for the artesian aquifer. The paragraph also describes a downward vertical gradient of 1.6 feet between S-85-8a and -8b. The quarterly groundwater elevations given in the annual groundwater report for 1998 indicate an upward gradient averaging 3.89 feet.

Please clarify these issues.

68. **Page 2-23, Paragraph starting with Line 6.** WESTON was not able to reproduce the retardation factor reported in this paragraph using the assumed input parameters given. The calculation should be checked and the formulas used should be reported. The retardation values will be large and the estimated travel times will remain excessive however the travel times will need to be revised to agree with any adjustments to the retardation factors.

69. **Page 2-23, Migration to Flathead Lake.** Why is a model applied to this analysis and not to the previous analysis on migration to the town well? The input parameters used should be consistent with those used in the preceding section.

70. **Page 2-24, Paragraph starting with Line 3.** The Domenico model is justified herein on the basis of the plume being at steady state. This is an assumption model is, in any case, as good a tool as any and the fact that the plume may not be at steady-state does necessarily obviate the use of the model.

71. **Page 2-24, Paragraph starting with Line 7.** Sorption is included in the Domenico modeling in the form of a retardation factor. The second sentence should be modified to include sorption. A table of input values should be provided in the main body of the text.

72. **Page 2-24, Line 10.** Reference is made to a value for the half-life of naphthalene and benzo(a)pyrene. Identify the values and the source of the values. This type of information should be incorporated into the section that discusses characteristics and properties of the constituents, to comply with the required TI components.

73. **Page 2-24, Line 12.** In what way is attenuation a function of distance? Please expound.

74. **Page 2-24, Line 13.** Reference is made to "the source area." Please specify what is the source area (e.g., CERCLA lagoon, swamp pond area, drainage ditch, beach sediments.)

75. **Page 2-24, Line 13.** The distance from the source area to Flathead Lake is described as 1000 feet. However, Appendix C, page C-8 reports the distance used in the modeling effort as 500 feet. This discrepancy should be explained or resolved.

76. **Page 2-24, Paragraph starting with Line 16.** There is no discussion provided regarding any calibration attempt with the Domenico model. In the absence of model calibration, the predicted concentrations are unreliable and should not be used. Also the source input used in the model should be described in this section.

77. **Page 2-24, Paragraph starting with Line 16.** This paragraph reports the results of the modeling effort described in Appendix B. The modeling results reported here reflect the simulations, which included biodegradation. This should be noted since the contribution of natural biodegradation is not discussed elsewhere in the text and is in fact specifically omitted from the mass removal calculations provided in Section 2.3.

78. **Page 2-24, Line 26-27.** A statement is made that a discrete pool of DNAPL does not exist. This should be modified to say that a discrete <u>accumulation</u> of DNAPL <u>has not been observed</u>.

79. **Section 2.4.5.** To support the statement that an accumulation of DNAPL has not been observed, it would be beneficial to the reader to know that historically measurements of DNAPL were attempted, the method that was employed to measure, the results of the measurements, and on which wells/piezometers/boreholes were the measurements taken. In general, all the statements made in this section need to be fully demonstrated to support the interpretations and conclusions.

80. **Section 2.4.5.** The bedrock aquifer (including the 10-foot gravel layer) needs to be discussed. It is not addressed at all.

81. **Page 2-24, Line 31.** The bullet reports permeability values different from those reported in Section 2.2.3 (page 2-10). While the range is similar the values used in summary of the conceptual model should agree with those used elsewhere in the report.

82. **Page 2-25, Line 8.** The bullet describes the geologic material as silty clay with no sand lenses from 65 to 100 feet BGS. This appears to be based on one boring. If more data confirm this condition, they should be discussed in Section 2.2.1 and supplement the subject here.

83. **Page 2-25, Line 14.** What about potential discharge of groundwater to the slough? When the system is shut down and pretreatment potentiometric surface and groundwater flow direction stabalize to natural conditions, the slough will be downgradient. Please address.

84. **Page 2-25, Line 16.** The last paragraph states that the "...contaminants present at the site are largely hydrophobic, meaning that they are fairly insoluble in water...". While this is true of the PAH compounds, it is not true of the SVOC compounds. They are relatively soluble and mobile in groundwater. The statement that the most mobile DNAPL constituent is naphthalene is likely not correct. The SVOC compounds encountered are most likely also present in the DNAPL. The potential impact from some of the SVOC compounds has not been addressed. The understanding of the chemical and geochemical characteristics/properties of constituents of concern is a basic premise of the TI evaluation process.

85. **Section 3.** The introduction indicates that "Operational data from the Phase I groundwater treatment system is reviewed and used to assess the performance of the system in terms of its ability to meet remedial objectives." Except for the last two paragraphs in the section, the latter statement is not included in this section, but rather in section 4. The "ability to meet remedial objectives" should be deleted or a sentence added to reference Section 4.

86. **Page 3-1, Line 14.** In the environmental field, use of the word "abandoned" can imply an approved method of closure. If this is the case for the CERCLA lagoon, please describe the method of abandonment (e.g., stabalized with ?, backfilled with ?, covered and capped, or what). Please describe the configuration of the lagoon from 1971 to 1993.

87. **Page 3-1, Line 14.** The sentence should be revised to read: "In 1971, use of the CERCLA lagoon and ditch was discontinued, and in 1984 BNSF implemented a recycling program to eliminate all wastewater discharges."

88. **Page 3-1, Line 21.** Please resolve the discrepancy of the volume of soil excavated for the swamp pond as indicated in the text (3,000 cu. yd.) with that shown on Figure 3-1 (19,000 cu. yd.).

89. **Page 3-1, Line 21.** The statement is made that "the most heavily contaminated soil...." was removed. Estimate how much contaminated soil remained and address this in Section 2.3 and appropriate subsections.

90. **Page 3-1, Line 25.** References is made to "...the Somers plant..." specify what plant, the remedy treatment plant or the publicly owned treatment works (POTW)?

91. **Page 3-1, Line 34.** Contaminated beach sediments were reportedly not encountered below

1.5 feet. Reference the confirmation samples, boreholes, test pits, etc. to substantiate this statement.

92. **Page 3-2, Paragraph starting with Line 3.** Please provide more detail on the stained soil and seep encountered in the test pit. For example, how deep was the stained soil; how large an area was stained; what happened to the stained soil; how much stained soil was left in place; did the stained soil appear to extend towards the lake; what was the appearance of the seep liquid; and was the seep sampled? Indicate the location of the test pit, the stained area, and the seep on Figure 3-1. Should this issue have been addressed in Section 2.3?

93. **Page 3-2, Line 18.** For clarification the sentence should read: "Figure 3-1 shows the soil volume excavated at <u>these</u> various ...".

94. **Page 3-2, Line 22.** For clarification the sentence should read: "Soil and sediment were treated in <u>an on-site LTU</u>..."

95. **Figure 3-1.** Add a table to the figure to summarize the information on the figure. Suggest table include area identification, area name and volume excavated.

96. **Page 3-4, Third Paragraph.** The discussion should be supplemented with a map (or reference to a previous figure) to show the location of the wells and the layout of the extraction/injection system.

97. **Page 3-5, Line 18.** Reference is made to limited discharge to injection wells. Provide data and information to substantiate this statement.

98. **Page 3-9, Line 6.** Reference is made to injection rates of 200 to 300 gpd. However, this is not reflected in Table 3-2. The discrepancy needs to be addressed. If the numbers given in Table 3-2 are an annual average, this needs to be specified either in the table or when the table is referenced, or both.

99. **Page 3-9 Line 14.** Paragraph needs to be substantiated with a summary of data, e.g., volume distribution of treated water to injection wells, infiltration trench, retention pond, or the local POTW.

100. **Page 3-9, Section starting with Line 21.** This section should be supplemented with hydrographs of monitor and pumping well water elevations, to assist in determining extraction system performance through time.

101. **Figure 3-4.** The y-axis label needs to be changed to indicate both injected and extracted volumes are shown in the graph.

102. **Page 3-12, Line 8.** The statement that "the CERCLA lagoon area is in effect naturally contained due to the very low hydraulic conductivity" can not be substantiated. The facts are that oily creosote was observed in BH-3 to a depth of 55 feet bgs (with creosote odors to a

depth of 75 feet bgs) and PAHs are detected in S-88-3 540 feet south of Somers Road. This statement is misleading and should be deleted here and elsewhere in the document.

103. **Page 3-12, Groundwater Flow Model.** The discussion in this section regarding the need to reduce the hydraulic conductivity values in the model in order to achieve a suitable match with observed conditions should include a discussion of the efficiency of the extraction wells. If the extraction wells are less that 100% efficient, the drawdown observed in the wells will not be reflective of the drawdown in surrounding aquifer materials. In addition, the loss of efficiency will limit the amount of withdrawal possible from a given well such that the aquifer may appear to be less transmissive.

104. **Page 3-14.** The data presented in Table 3-3 and the discussion provided in the paragraphs starting at lines 11 and 18 need further explanation. What were the concentrations used for the calculations? Why are SVOC separate from PAH in this analysis and why are SVOC mass estimates being compared to PAH estimates provided in Section 2.3?

105. **Page 3-14, Paragraph starting at Line 11.** The comparison of mass removed to estimated total mass remaining should include the estimated value (adsorbed and dissolved factions), as well as the reference to the previous section in which they were estimated.

106. **Page 3-14, Paragraph starting at Line 18.** The discussion in this paragraph relates increased removal to increased injection rate and increased precipitation. The connection between these observations is not obvious and should be explained.

107. **Page 3-14, Lines 19-21.** It is not clear how the increase in mass removal in 1996 is related to either precipitation or injecting water into a contaminated well. Please expound.

108. **Page 3-14, Changes in Groundwater Quality.** The quality of extracted groundwater does not address the impact on overall groundwater quality. The observed remaining concentrations in groundwater are the only real indicators of impact on groundwater quality. Thus the importance of providing historical groundwater data in a comparative format. Understanding the nature and extent of contamination is a basic premise of the TI process.

109. **Page 3-14, Line 26.** Reference is made to "...several monitoring wells...". Identify the wells and reference the historical data (that should be included in an Appendix to the report).

110. **Page 3-15, Line 9.** The statement that "Groundwater quality in wells outside the well field also remains unchanged" seems completely unsupportable in light of the reported increase in concentrations in well S-6 and the fluctuation in well S-88-3 concentrations.

111. **Page 3-15. Last Paragraph.** The discussion with regard to water quality should be supplemented with a summary presentation of the historical water quality data, as previously commented.

112. **Page 4-2, Fifth Bullet (Line 27).** Attributes the absence of NAPL in wells EW-6, IW-6, IW-7 and IW-8 to the operation of the extraction system. Although this is possible, no definite correlation has been established. Until recently, wells IW-6 and IW-7 were bailed to remove product from the wells.

113. **Page 4-2, Fifth Bullet (Line 27).** The statement that dissolved phase concentrations have remained constant is <u>not</u> well supported by the data. The casual review of time versus concentration plots suggests that concentrations are not stable and in fact may be increasing. This statement must be more robustly defended.

114. **Page 4-3, Second Paragraph.** This discussion of the PV needed to meet standards is exactly what is needed to support a TI. Expand the calculation to provide more basis.

115. **Page 4-6, Fourth Paragraph.** The statement is made that only Alternative 6 would correspond to a waiver of ROD groundwater cleanup criteria. It is unclear why Alternative 5 would not also be amenable to a waiver. The apparent predisposition for Alternative 6 needs more support.

116. **Page 4-6, Institutional Controls.** In addition and depending on depth of installation, all existing private wells for a mile downgradient of the site should considered for abandonment.

117. **Page 4-6, Line 22.** What is the time frame anticipated for the abandoning of the injection and extraction wells?

118. **Page 4-8, Line 2.** Until an evaluation of the surrounding private wells is conducted, WESTON is cautious with regard to the assumed "...natural limitations of low yield and high iron content..." as an effective means of preventing groundwater use. This information is important to the TI evaluation, as previously commented, to address potential receptors.

119. **Page 4-9.** The recommendation for institutional controls is not well enough supported. If this alternative meets the objective of containing the plume, explain the observed concentration at S-6 and the apparent increases at other wells (Figures 2-6 and 2-7). Also, it is not acceptable to suggest institutional controls without a monitoring plan included.

120. **Page 5-2, Line 9.** This paragraph reiterates the conclusion that the most mobile COC is naphthalene. The SVOC compounds are more mobile and should be considered. The characteristics and properties of <u>all</u> of the site's contaminants of concern must be included in the TI evaluation.

121. **Section 5.2.** The vertical considerations of the hydrogeologic system and potential migration of contaminants to the gravel zone above the bedrock surface or into bedrock and not addressed. The TI process requires both vertical and horizontal evaluation.

122. **Section 5.2.1.** The discussion in this paragraph does not include consideration for ownership change and perpetuity to protecting the withdrawal of groundwater. It also appears to presume

that contaminants will not migrate across the property boundary or in a vertical direction. A map identifying the presumed boundary is necessary to understand the extent of the boundary. Discussion needs to be expanded to incorporate perpetuity conditions on withdrawal of groundwater and future land use.

123. **Page 6-1, Line 28.** Use of the word "pool" should be avoided, as commented previously.

124. **Page 6-2, First Bullet.** The recommendation should not include a choice of area for institutional control. An evaluation should be made of the potential areas and the most protective option selected and included in the recommendation.

125. **Page 6-2, Second Bullet.** Recommended action includes discontinuing the operation of the Phase I system. The document does not sufficiently support evaluation with regard to the impact of not operating the system. Potential data gaps in groundwater monitoring downgradient of both historical and current source areas has to be addressed in order to assess if any impacts to groundwater occur in the future.

126. **Page 6-2, Third Bullet.** It should be determined what state and local agency involvement is required and that action clearly stated and included in the recommendation.

127. **Page 6-2, Fourth Bullet.** In order to conduct a TI evaluation, the elements of the proposed groundwater monitoring program have to be defined to include identification of wells for sampling, sample frequency, and establish a time frame for sampling. The program also has to identify what standards will apply to determine if additional remedial action is necessary at some point in the future.

128. **Page 6-3, First Bullet.** The additional remedial action selection should be included as a planning item. The remedial selection process should be complete and plans in place before the monitoring activities indicate the need for additional remediation. The TI evaluation cannot be performed without knowing the actions to be taken, if necessary.

129. **Section 7.** The reference list is incomplete. There are many references in the text that are not included here.

130. **Appendix A, Figure A-1.** There are numerous discrepancies between the cross-sections and Figure A-1 (e.g., BH-3 is omitted from Figure A-1 but is shown in Figure A-4). The figure needs to be modified to show <u>all</u> well and boring locations identified in the subsequent cross-sections. This map could be used to summarize the status of wells, boring and piezometers at the site, e.g., monitored, water level only, piezometer, extraction, injection, etc.

131. **Appendix A, Figure A-1.**

132. **Figure A-3.** Well 93-7 should be included in the cross-section.

133. **Figure A-4.** Well 84-4 should be included in the cross-section.

134. **Figure A-6.** The cross section depiction of S-84-7 does not match the log provided in Appendix D from 6 feet bgs on to total depth. The discrepancy should be researched and corrected as appropriate. All the logs to cross sections (and vice versa) should be verified.

135. **Appendix B – General.** The stated objective for the modeling effort is to compare observed extraction system performance with model predictions. Although it is not stated, the apparent value of this exercise is to recalibrate or verify the model against new field data. In order to have this task represent the best possible effort, it is first necessary to be sure the field data is properly represented. Specifically, the drawdown values from the extraction wells and the mound values from the injection wells are a function of many phenomena in addition to aquifer parameters and simple hydraulics. For example, well efficiency will dramatically affect the observed drawdown or mounding especially in a setting with materials having a relatively low permeability. Partial penetration will also effect the observed drawdown or mounding values. Since MODFLOW implicitly simulates perfectly efficient fully penetrating wells an adjustment must be made in the observed data prior to making a comparison to model predictions. If the corrections for partial penetration and well efficiency are not performed, the resulting verification of the model will hold little meaning.

136. **Appendix C, Section C.2.1.1, Page C-7.** The first paragraph in this section describes the source concentration used for the model. The value used was based on concentrations observed in well MW-93-2S which is in excess of 100 feet downgradient of the area where DNAPL is present. A more representative concentration would be the solubility of the chosen contaminant, in this case naphthalene. This paragraph also characterizes the solubility of naphthalene as relatively high. While this may be true relative to other PAH compounds, it is not high in comparison to the SVOC compounds present at the site.

137. **Appendix C, Section C.2.1.1, Page C-7.** The second paragraph contains a table which presents the input parameters used to calculate groundwater velocity for the model. Although the calculation seems correct, the resulting velocity is extremely low. The hydraulic conductivity is lower than reported in Section 2.2.3 of the report by a factor of four and the gradient reported is lower than that shown on Figure 3-5 by a factor of four. The combined effect of these differences is to change the resulting velocity by two orders of magnitude. If the values used are based on some other data, they should be explained and supported.

138. **Appendix C, Section C.2.1.1, Page C-8.** The first paragraph describes the decay parameters used by the model. It is assumed that anaerobic degradation is occurring at the site. This assumption seems to be in conflict with statements made in previous response to comments and is inconsistent with the position taken in Section 2.4.3 regarding biodegradation. Also, the actual values used are not reported.

139. **Appendix C, Section C.2.1.1, Page C-8.** The second paragraph on this page describes the retardation factor input parameter. The chosen contaminant is naphthalene which again is not the most mobile of site contaminants when compared to SVOCs. The value calculated for input to the model is not presented. Also, 0.1 percent organic carbon content is not necessarily

a conservative value. It is not unusual for porous media to exhibit concentration of organic carbon in the range of 0.01 percent.

140. **Appendix C, Section C.2.1.1, Page C-8.** The third paragraph on this page describes the distance to receptor assumptions made for the model. It is not clear from this discussion where the source area is, however, the receptor is described as Flathead Lake. The distance of 500 feet is however inconsistent with the value of 1,000 feet given in Section 2.4.4 (migration to Flathead Lake).

141. **Appendix C, Section C.2.1.3, Page C-9.** This section describes the results of the modeling effort. The results reported for the case including biodegradation do not include the estimated time needed for the contaminants to reach Flathead Lake.

Attachment 2

The following table provides a summary of the July 13, 1998 comments prepared from the Phase II Design Document, cross-referenced to where the text and comment would apply in the TI Document.

Phase II Design Document Comment No.	TI Document cross-reference
2	p. 2-13, line 30, paragraph
3	p. 2-16, Section 2.3.5
4	p. 2-6, line 8 paragraph
5	p. 2-6, lines 24 to 29
6	p. 2-6, line 39 to p. 2-7 line 1
7	p. 2-10, Section 2.3.3
10	p. 3-9, groundwater elevation data
11	p. 3-12 groundwater flow model discussion
13	p. 3-13, formula following line 21
14	p. 3-14 discussion following table 3-3
15	p. 3-14, line 18 paragraph
19	p. 4-2, line 27 bullet, Section 4.2
20	Section 2.4
21	p. 2-22, line 17, Section 2.4.4
22	p. 2-22, line 23, Section 2.4.4
23	p. 2-24, line 12, Section 2.4.4
24	p. 2-24, line 16, Section 2.4.4
26	p. 2-24, line 31, Section 2.4.5
27	p. 2-25, line 8, Section 2.4.5
28	p. 2-25, line 16, Section 2.4.5
29	p. 5-2, line 9, Section 5.1
32	Section 7
33	Appendix B same
34	Appendix C same
35	Appendix C same
36	Appendix C same
37	Appendix C same
38	Appendix C same
39	Appendix C same